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A Survey Practitioner's Notion of Nonresponse

by

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Introduction

The following is a brief discussion of the various aspects of response/ nonresponse. The ideas presented in this paper emerged from meetings with a number of survey statisticians at Statistics Sweden. I feel that it would be useful for survey statisticians to have access to this summary and an unedited discussion of some of response/nonresponse problems I encountered while at Statistics Sweden. I have dealt briefly with the following topics:

1 Importance of Nonresponse (General)
2 Definitions of Response/Nonresponse
3 The Role of Nonresponse in Surveys:
  (i) Survey Design
  (ii) Data Collection
  (iii) Analysis
  (iv) Survey Management
4 Dealing with Nonresponse
5 Data Processing/Estimation
6 Reporting of Nonresponse
7 Recommendations and Research

1 Importance of Nonresponse (General)

Statistical information is usually derived from surveys and censuses. Whatever its source the information will suffer from missing observations due to nonresponse. Nonresponse has been generally, but to a varying degree, recognized as an important measure of data quality. It introduces a possible bias in the estimates and increases the sampling variance due to a reduction in sample size. It is known that, in the case of simple random sampling, the sampling variance varies inversely with the sample size. This relationship holds approximately true for any sample design. Thus, the variance of an estimate based on

80 % response rates will be about 12.5 % higher than the one based on 90 % response rate.

The relationship between the bias and the size of the nonresponse is less obvious since it depends on both the magnitude of nonresponse and the difference in the characteristics between respondents and non-respondents. Let us assume, however, that the nonresponse bias is proportional to the nonresponse rate. Then, regardless of the size, whether it is large or small the percentage bias due to nonresponse is the same in contrast to the sampling variance that depends upon the sample size. One can therefore speculate about the relative importance of the two components of the MSE in both the interpretation of survey results and in the allocation of funds at the sample design stage. To illustrate this, let us look at the coefficient of variation. When sample size increases, the coefficient of variation of an estimate will diminish. The percentage bias, however, will remain the same as long as there is no change in the size of the nonresponse rate. Thus, relative to the size of the coefficient of variation, the bias assumes a more important and dominating role as far as the estimate is concerned. This would imply that in large samples, usually designed for estimates at a national level, survey designers should concern themselves more with the magnitude of the bias than with the magnitude of the variance. On the other hand, the bias due to nonresponse may not be nearly as serious relative to sampling variance for small samples. In this case, the variance will assume the dominating role due to an increase in its size relative to the nonresponse bias. It should be noted that the confidence interval of the estimate may be affected accordingly. In small samples, the confidence interval may cover the true value with the prescribed probability but it may not do so in the case of large samples. This is due to the relative sizes of bias and variance as the components of MSE.

This simple analysis may have an important practical application. For example, if the main purpose of a survey is to obtain estimates at a national level, more attention should be paid to the reduction of biases. In other words, more resources should be allocated to training

interviewers and controling the interviewing process. Of course, the opposite would apply if the estimates were required for small areas.

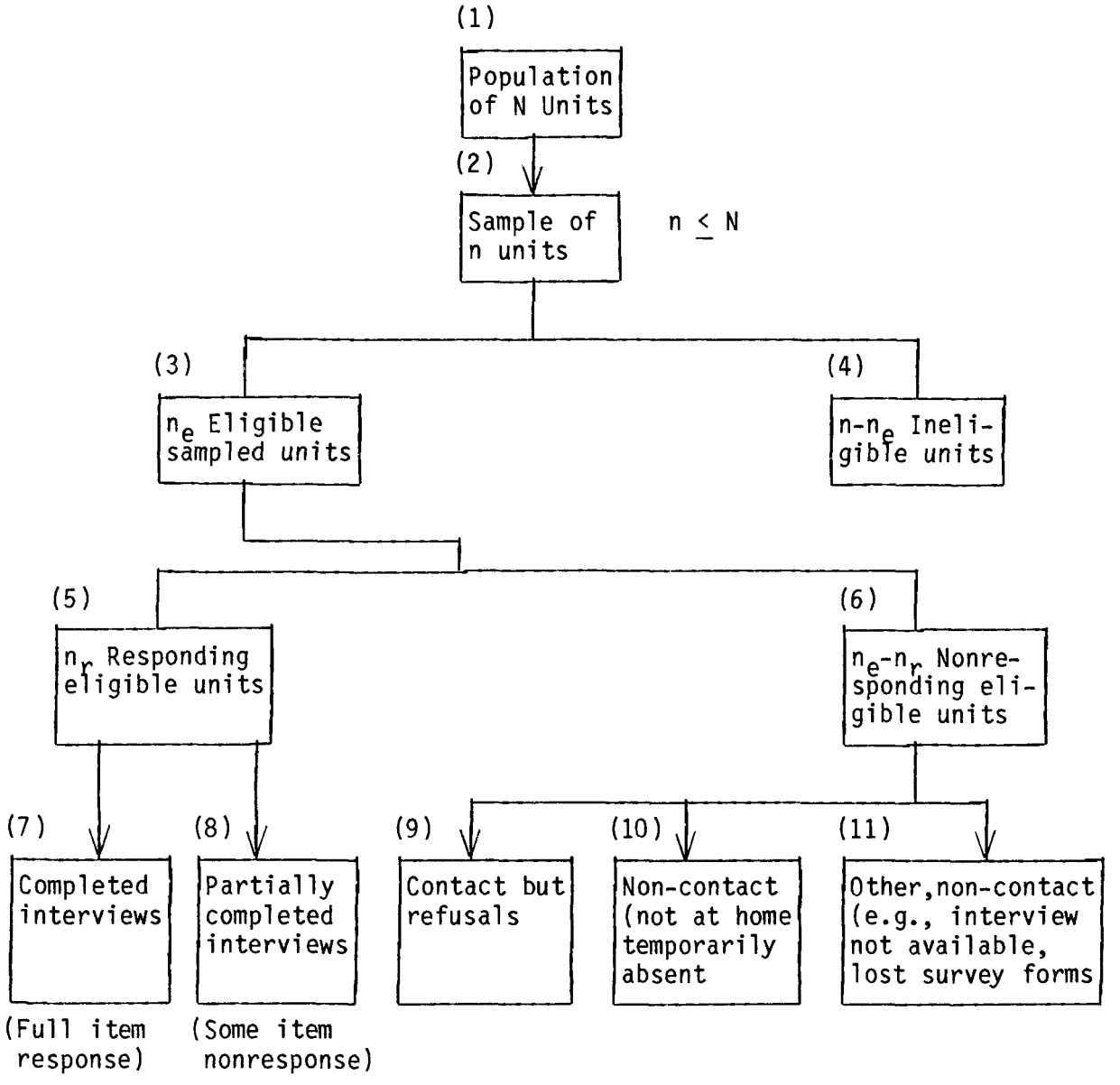
Unfortunately, in practice, survey results are used at both levels and the above observations, although helpful, should be used judiciously. At the different stages of a survey, knowledge of nonresponse or its different components may be very helpful in assessing operational problems. This aspect will be discussed later in connection with various stages of surveys.

2 Response/Nonresponse Definitions

Recently, nonresponse has been increasing in many surveys all over the world. There is a greater need than ever before to monitor nonresponse rates, to make comparisons between surveys, countries, etc. There is undoubtedly a need for greater comparability and standardization of definitions. The lack of standardization seriously impedes theoretical investigation.

Given certain survey conditions, nonresponse is defined as a failure of obtaining usable data from a survey. Table 1 illustrates response/nonresponse components as they may appear in a survey. The components will be used in defining various nonresponse rates.

Table 1 RESPONSE/NONRESPONSE COMPONENTS



In general it is easier to talk about response and, of course, nonresponse is simply its complement. The most frequently used definition of response rate is the ratio ($\hat{R}$) of the number (n_r) of responding eligible units in the sample to the number (n_e) of eligible units in the sample or:

$$\hat{R} = \frac{n_r}{n_e}$$

The nonresponse rate ($\hat{NR}$) is defined by ($\hat{NR}$) = 1 - $\hat{R}$.

Many other definitions of "response" rates have been applied, each serving a different purpose.

For example:

Contact rate = $\frac{\text{Completed interviews + Refusals}}{\text{Completed interviews + Refusals + Non-contact}}$

$\frac{\text{Box(5) + Box(9)}}{\text{Box(5) + Box(6)}}$, where "completed" may include some with item nonresponse.

Completion rate = $\frac{\text{Number of interviews}}{\text{Number of selected units}} = \frac{\text{Box(5)}}{\text{Box(2)}}$

or

$\frac{\text{Number of interviews}}{\text{Number of eligible units in the sample}} = \frac{\text{Box(5)}}{\text{Box(3)}}$

or

$\frac{\text{Number of interviews}}{\text{Number of contacted units}} = \frac{\text{Box(5)}}{\text{Box(5) + Box(9)}}$

Eligibility rate = $\frac{\text{Number of eligible units in the sample}}{\text{Number of units in the sample}} = \frac{\text{Box(3)}}{\text{Box(2)}}$

These rates define total response/nonresponse and each of them can be split up into components defined for specific areas, individual interviewers, or components of nonresponse. The important components of total nonresponse are: refusal, "no one at home", and temporary absent. All of these may be defined as rates, usually pertaining to the number of eligible units in the sample. One can define still other rates for a specific purpose if required.

Measures of nonresponse have many uses. Probably the two most important are to assess the interviewing process and to indicate the reliability of the survey. Different measures are appropriate for these two uses. For example, completion rate would indicate the rate of daily performance or interviewers' performance by area.This rate does not measure the quality of the survey. A high rate of nonresponse may have occured, but the completion work will surely include the number of such outcomes as have been completed. The nonresponse rate may be an indication of the work habits or pattern of the interviewer. Also, if response rate is low, say, under 80% (a more or less arbitrary number) then the possible bias should be at least the subject of speculation in any report.

a) Weighted Versus Unweighted Rates

All of the above rates are based on unweighted sample counts. They can also be computed as weighted rates. In this case the sample weights are applied to individual units in the numerator and in the denominator of each rate. The weighted nonresponse rates estimate the proportion of the population or sub-population that would not have responded to the survey under similar survey conditions. Unweighted rates, on the other hand, provide an indication of how well the data collection effort was carried out for the entire sample and in specified sub-populations. The latter may be defined in terms of interviewers, areas, and categories. Also they can serve as a means of managing the data collection efforts. One can obtain not only a good overall indication of response levels but also how well response is distributed in different areas and for individual interviewers. In

contrast the weighted rates may provide misleading information on data quality since they may distort the distribution of characteristics in the sample. The advantage of weighted rates, however, is that one obtains an estimate of the rate for the whole population. It should be noted that in a self-weighting sample the weighted and unweighted rates are identical.

b) Size of Response/Nonresponse Rates

Nonresponse rates vary from survey to survey. Some surveys have nonresponse rates above 50% and others only 4% to 6%. It is important to realize that it is the purpose of the survey that determines whether nonresponse rates are too high or too low. If the objective of a survey is to estimate a 10% item in the population, then a non-response rate of 5% would affect it considerably. On the other hand, one can think of a situation when a high nonresponse would not necessarily make the survey results useless. Like all statistics, response rates are subject to sampling and nonsampling variances and under the response probability model (Platek, Gray 1983), the expression for the variance of the rate may be derived.

An approximation of the variance of a response rate $\hat{R}$, according to any definition, may be given by

$$V(R) = \frac{\hat{R}(1-\hat{R})}{n'} \quad F$$

Where $R = E_1E_2(\hat{R})$, and E defines expectation

E_1 = expected value taken over all possible samples

E_2 = expected value over response probabilities of selected units

n' = sample size or number of units in the denominator of the rate

F = design effect.

"F" may be between 1 and 2 depending upon survey design and interview procedure. Thus, "F" could be close to 1 for mail surveys based on a simple random sample. For telephone surveys it may be close to 1.5 due to clustering effect of interviewer assignment. For personal interviews it may be about 2 due to combined effect of design clusters and interview clusters. This could be an interesting study to examine. To my knowledge, there has been no study published that examines the magnitude of the design effect.

3 The Role of Nonresponse in Surveys

The measurement of response/nonresponse as defined by various rates, is rather simple. The importance, interpretation, and control of these rates require some discussion.

Let us look at the role of nonresponse from the point of view of such survey operations as design, data collection, analysis and management of surveys.

(I) Design - At the planning stage it is important to make a decision about what level of nonresponse would be tolerated. It can be argued that for surveys where only national estimates are required and if the respondent's and nonrespondent's characteristics are fairly similar a nonresponse rate, of 20 %-30 %, may be tolerated. In this case the bias would be relatively small though there will be some increase in variance. The same argument would apply if we were to estimate trends and proportions. However, if the estimates have to be precise and are also required at various subnational levels, then the size of nonresponse should be kept as low as 5 % to 7 % and one should watch for pockets of high nonresponse in local areas.

Another important role that response/nonresponse plays is in the cost of survey. It is important to allocate the costs to various factors in such a way that nonresponse is sufficiently low to serve the goals of

the survey. It is frequently better to accept a smaller sample than originally planned and allocate more money to data collection and a follow-up. This would be appropriate if large differences are expected between respondents and nonrespondents. In the case of the above, experienced survey designers can estimate the sample allocation fairly accurately. In addition, and in a more formal way, survey designers may identify a number of important factors in survey design which will also affect nonresponse.

It is fairly self-evident that the following factors will affect nonresponse: sample frame, method of interviewing, selection, training and control of staff, length of questionnaire and wording, sensitivity of questions, subject, feasibility and the number of callbacks, and finally, publicity. Ideally a survey designer would like to conduct a pilot study or studies to test the importance of at least some of these factors. If experimentation is not possible, a thorough discussion based on past experience and intuition is essential to carry out a final design.

(II) Data collection stage - The importance of response/nonresponse rates at data collection stage is derived from their different uses. One can distinguish between "contact" and "no contact" types. One type such as "no one at home" or "temporarily absent" is in fact an example of "no contact" problem and is primarily an operational problem. The other type is a true nonresponse problem, where contact has been made with respondent but no response or an unacceptable response is obtained. The "no contact" type of problem is usually attacked with operational solutions. For example, in a telephone or personal interview, the time and pattern of calling a respondent are important. The size of assignment and the time allotted to data collection must be adequate. Further examination of "no contact" may show that some units are ineligible for the inclusion in the sample. Thus a vacant household is ineligible for a survey of occupied households but is eligible for a survey of all households. Other households may be mostly apartments occupied usually by younger persons, single and employed. Still other units may have other characeristics. Thus, the

importance of such nonresponse rates is that they may determine the strategy that is appropriate. This is especially important if the proportion of particular units that are part of the survey is relatively high.

The problem of refusals is somewhat different. It should be conceded at the outset that refusal rates are not always as straightforward as one might expect. An interviewer may prefer to record a refusal as "no one at home" or a respondent may simply not answer at the door as a means of refusing, so that the nonresponse is recorded as "no one at home". In a mail survey, one is not always certain whether a respondent has received the questionnaire and once having received it simply neglected to mail it. In our interview process itself, an interviewer may find units that should not be there or units with questionnaires fully or partially completed. Surveys dealing with sensitive subjects may not only affect refusals in that particular survey but may have an even more profound effect on the response levels of other surveys. An example of this could be seen in Canadian experience of income surveys and their subsequent effect on other surveys. In a longitudinal survey like LFS it took six months (6 rotations) for the respondents affected by the income survey to leave the Labour Force Survey. To avoid known pockets of nonresponse, it may be desirable to define survey population in such a way that such pockets are eliminated. But one must be aware of the difficulty to make inferences from such a survey population to the characteristics of the target population.

An important role that nonresponse plays at the data collection stage concerns the size of response in certain situations. For example, if nonresponse rates by interviewer or by interview areas are produced before final data collection, they may identify interviews and areas that need support in order to achieve satisfactory nonresponse rates. Also, if preliminary tabulations are made, they may indicate that the responding sample is either too small or too unequally distributed for satisfactory estimates of important population characteristics. A major data collection effort may then be made satisfactory for interviewers, areas and important population characteristics.

(III) Analysis - Strictly speaking, only the Mean Square Error i.e. bias and variance can provide an informal basis for survey results. But nonresponse can certainly affect its magnitude. If upon looking at survey results, we find that nonresponse rates are low, we feel quite confident of the survey results. On the other hand, if the nonresponse rates are high, it is frequently taken as an important evidence of poor quality data. The interpretation of measures of nonresponse are even more difficult when one deals with complex designs since the concentration of nonresponse may be higher in one area than in other. Still, response rates have been used as proxies for data quality by almost all survey statisticians. That is why the interest in collecting data on nonresponse and their evaluation has usually been part of survey taking. Yet, by themselves, nonresponse may or may not affect data quality. Also its effect may depend on the type of statistics that is being analyzed.

Mean - Intuitively, it seems that when we wish to estimate the mean of a characteristic, the size of the bias due to nonresponse will be determined by both the difference in the characteristics between the respondent and nonrespondent as well as the magnitude of nonresponse rate. Hence, if we have reason to believe, particularly when it is based on past experience that respondents and nonrespondents do not differ very much, then the bias due to nonresponse will be small and independent of the size of the nonresponse. In such a situation, we may not be concerned about following up nonrespondents. On the other hand, if respondents and nonrespondents do differ considerably, the bias will be large, unless the nonresponse rate is very small. In this case, a follow-up or some other way of reducing the size of nonresponse should be undertaken. In practice such a clear-cut situation never exists. An analyst is usually interested in estimating several means of characteristics rather than only one. Therefore, a safe procedure is to try to obtain a low nonresponse rate. The above can be easily seen from a simple expression.

Suppose in the population:

R = number of respondents
M = number of nonrespondents
N = R + M

Similarly r, m and n refer to sample values.

If no compensation is made for nonresponse the respondent mean $\bar{y}_r$ is used to estimate $\bar{Y}$.

$$E(\bar{y}_r) = \bar{Y}$$

and the bias $B(\bar{y}_r) = \bar{Y}_r - \bar{Y} = \bar{Y}_r - (\bar{R}\bar{Y}_r + \bar{M}\bar{Y}_m)$, where $\bar{R} = R/N$; $\bar{M} = M/N$

$$= \bar{Y}_r(1 - \bar{R}) - \bar{M}(\bar{Y}_m)$$

$$= \bar{M}(\bar{Y}_r - \bar{Y}_m) \text{ since } 1 - \bar{R} = \bar{M}$$

which demonstrates what was discussed intuitively above for the formula also shows the constitutions under which $\bar{y}_r$ is un unbiased estimate for $\bar{Y}$.

Total - If we were going to estimate the total population Y then it seems natural to assume that the bias in the presence of nonresponse will be small if only the number of nonrespondents is small. In this case, we must attempt to make nonresponse as small as possible. This can be seen from the following.:

$$E(\hat{Y}) = Y_r$$

$$B(\hat{Y}) = Y_r - Y = Y_r - (Y_r + Y_m) = - Y_m = - M\bar{Y}_m$$

The above expression is zero if $M = 0$ or $Y_m = 0$.

Variances and covariances - Other statistics besides means and totals are affected by nonresponse. These include, for example, estimates of variances, covariances and correlation coefficients. Variance and covariance estimates should account for the additional sampling and non-sampling errors that arise from nonresponse and avoid treating imputed values for missing data as observed data. When weight adjustments by inverse response rates are employed to inflate the deficient sample, the variance and covariance estimates may be subject to small biases, relative to their true values in the population as long as appropriate replication methods are applied. The bias depends upon the way replicates are formed for variance/covariance analysis as well as the way adjustment cells for weight adjustments are delineated. One would have to set up a sampling/nonsampling error model along the lines of Platek and Gray (1983) or J. Lessler (1983) and examine the bias of the variance/covariance estimate.

When hot deck or historical survey data are substituted for missing values, the tendency is to treat the substituted data as real data. The variance estimates will probably be under-estimates under these circumstances, especially in the case of hot deck substitution, which is merely duplication of survey results from similar types of respondents. In the case of historical data substitution, if that data are highly correlated with current data, then one may be justified in treating that data as observed responses in variance/covariance analyses.

Thus, it may be observed that the compensation for nonresponse as well as nonresponse itself can affect various statistics differently. This fact may be helpful in the choice of the appropriate method for reducing controlling, or dealing for nonresponse, the last of which is covered more extensively in section V.

(IV) Survey Management

Survey management is defined here as a series of control measures which would ensure that a survey produces statistics of an acceptable

quality. Some of the measures have a preventative character. Others attempt to measure the effectiveness of such programs in maintaining the quality. Thus, a careful analysis of nonresponse rates may help identify weaknesses in various program. For example, any weakness in the training of interviewers or the lack of proper understandning of interviewing procedures and conceptual issues will result in a higher bias. Also, the lack of adherence to interviewing procedures may result in systematic errors and increase the correlated response variance. Two programs which would help analysis of some of the nonresponse rates and their possible effect on data quality are observation and reinterviewing. Observation generally occurs at the time of the actual interviewing. It provides an opportunity for training (or retraining) and motivating the interviewer and identifying field problems. Some interviewers whose nonresponse rates are relatively high may be subjected to more frequent observation. Thus, the measures of nonresponse would determine intensity and frequency of control programs.

A reinterview is an interview with the units that have already been interviewed during survey. The difference observed between the two sets of nonresponses are attributed to several sources such as respondents interview and reinterviewer. It is the interview preference that concerns us here with respect to nonresponse rates in certain areas and in certain categories of population. Any changes in response rates may be examined by attempting to explain these changes. There again, the measures of nonresponse rates determine the intensity and frequency of reinterviews.

A more direct reaction to nonresponse would manifest itself in looking and examining interviewers work assignment, training, payments as well as the sample design. For example, for the same surveys and under similar survey conditions one would expect a fairly uniform level of nonresponse due to "no one at home". If there is a large change between the same survey on two different occasions, then a number of causes can be identified. One is that there has been a change in interviewing procedures. Another possibility is that interviewers did

not plan their work properly. From the design point of view, it may be that the target population may have been changed at the design stage. All of these possibilities should be examined.

It should also be emphasized that the surveys management should be aware that nonresponse and response errors can be related. For example, if a potential respondent is pressured to provide information that he/she would prefer not to provide, the respondent may give information that is not correct. This event is sometimes referred to as the phenomenon of the "reluctant" respondent.

4 Dealing with Nonresponse

It has been mentioned that at the design stage an understanding of the origin of nonresponse and its effect on survey data will undoubtedly lead to minimizing the size of nonresponse at the data collection stage. The main efforts for dealing with nonresponse, however, takes places in the actual collection of data and at the processing or estimation stage.

Data Collection - Let us begin with specific strategies that can be used to reduce nonresponse at this stage.

a) Callbacks - Nonresponse can be reduced by persistent efforts of interviews and by motivating nonrespondents to become respondents. The persistent efforts are usually in the form of callbacks which are an essential part of any survey. It is inituitively clear that households that are at home on the first call are likely to differ from households that are not at home. This has long been established by various studies. Thus, reliance on those at home on the first call will likely result in a survey depending heavily on households with a relatively large number of family members and relatively few workers. Thus, it is useful if interviewers, in their first call, ask when certain members of the household will be available. Results of earlier surveys may provide useful information on the proportion of households available for the first, second, and subsequent calls. This could be used in

estimating the costs of interviewing. Another use of callbacks has been to take them into account for estimation purposes, e.i. the Politiz-Simmons method. There is a point, however, beyond which it is impossible to attempt further callbacks. This may be due to time limitations for publishing data or to insufficient funds.

b) Proxy - A second major technique in collecting data is to designate an alternative respondent. For example, the survey instructions may state that any one age 20 and over may respond for other members of the household. Obviously such responses are less likely to be correct than the responses of the designated person. Still, for certain types of surveys this may not be dangerous. If the requested information is confidential or personal, then the proxy response may be quite misleading. Studies of proxy interviewing should be undertaken before its application in a particular survey.

c) Quota-Samples and Substitution - Many of the same problems occur for both quota-samples and substitution. Both techniques may be useful, but is unlikely that they should be used when there are stringent quality requirements. In quota sampling, the population is stratified usually corresponding to variables expected to be closely related to the response that may be given. For example, a sample of households is selected and the interviewer is given instructions to obtain a given number of interviews from people falling into certain categories of age, sex, and income. The danger in such procedures is that the actual selection is made by the interviewer from those who present themselves in these categories. The question is how much risk (bias) survey designers are willing to accept balanced against the cost of making callbacks. Quota samples will essentially have no nonresponse because the interviewer does not keep a record of those who refused to give the information. This does not, however, mean that the survey results are unbiased with respect to the target population.

d) Substitution rules are another method of avoiding nonresponse and the necessity of callbacks. In this method one would substitute a previously unselected unit, for example, a next door neighbour.

Unfortunately, this would lead to a sampling bias due to changing inclusion probabilities. While the sampling bias would increase, the sampling variance may be reduced because of an increase in the effective sample size. Whenever a substitute is made it should be recorded. The use of a substitute should be a subject of careful analysis. For certain characteristics and certain considerations, it may be acceptable.

e) The use of incentives is well established and often used. An incentive may be less costly than an additional call. The planning of incentives should be based on the cost of additional calls that might otherwise be made in an effort to complete the interview. But the use of financial incentives has many concerns. Firstly, this may become an accepted practice and the cost of surveys may increase. Second, to obtain incentives, erroneous information may be given by the respondent. It may be argued, however, that providing information may be a burden for respondents and they should receive some sort of compensation.

f) Network sampling is a method for obtaining information by defining a cluster of units. Each unit is able to provide some information concerning the other units in the cluster. The disadvantages of network sampling are similar to the disadvantages of sampling by proxy. On the other hand, in surveys intended to provide information concerning rate occurences, the use of this method may be essential.

g) Randomized response technique is used when the respondent would prefer not to provide controversial data. This technique is very seldom used if at all in government surveys.

h) Dubling sampling is a method of subsampling nonrespondents. This method is extremely well discussed by Ingrid Lyberg in her paper in honour of Tore Dalenius.

i) Data Processing/Estimation - There are many procedures, types of weighting or imputation that can be used to compensate for missing

data. The choice between weighting and imputation is not always an easy one. In general, the following questions should be considered before deciding on a particular procedure.

1) The reliability of the resulting estimates
2) The feasibility of the methods to produce a variety of different estimates from the same survey.

There are a number of papers published by the Panel of Incomplete Data which deal in great details with various methods for missing data.

I have, however, summarized various procedures in Table 1.

Table 1: Procedures for Dealing with Nonresponse and Implications

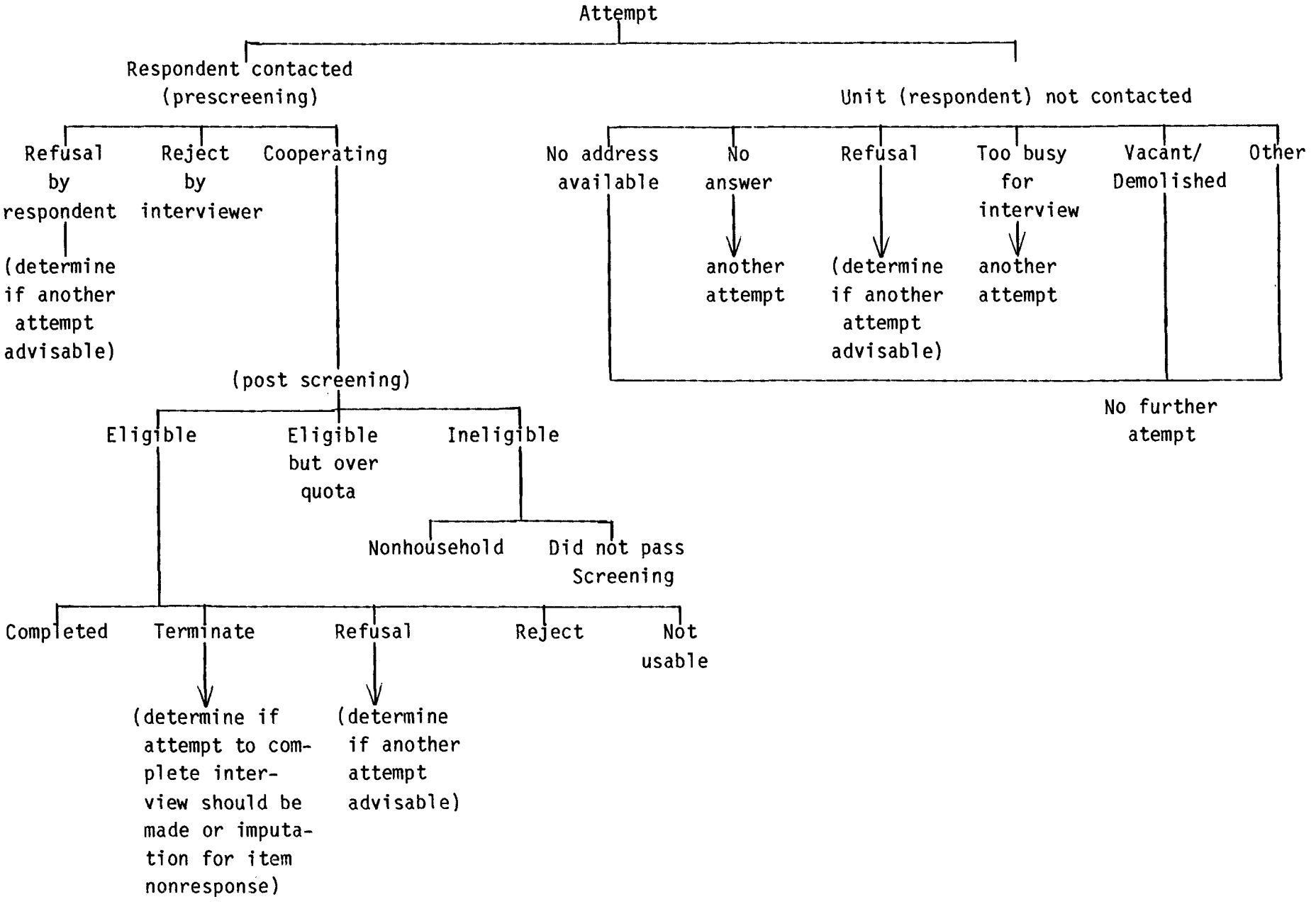
Stage of Survey	Dealing with Missing Data	Implications
Planning	- unit nonresponse rates anticipated from earlier experiences of similar type of survey, according to method of gathering survey data.	- various strategies must be determined for the field and processing stage (callbacks, imputation, etc)
	- sample increased to allow for nonresponse (over sampling).	- sampling variance would likely remain as expected; however nonresponse bias remains.
	- pilot studies to test questionnaires and field procedures.	- one attempts to reduce response error and item nonresponse.
Interviewer Training	- aptitude testing, scenarios for survey taking, clustering of assignments to permit callbacks.	- experienced interviewers should be able to mimimize nonresponse and hence, bias especially in continuous surveys; for ad hoc surveys there may be little one can do but make repeated callbacks, resulting in higher costs per selected unit.
Survey Data	- attempt callbacks, mailbacks, repeated phone attempts until as many successful responses are obtained as possible; attempt to convert refusals through diplomacy, media, etc.	- more callbacks increase the cost per unit, especially if proper time for interview cannot be determined from neighbours; reduced level of nonresponse reduces sampling variance and nonresponse bias.
	- substitution of other units in the field not originally selected.	- reduced sampling variance but there may exist sampling and nonresponse biases.
	- substitution of other units from a pool of reserved units (increase of sample to compensate nonresponse).	- reduced sampling variance and no sampling bias but nonresponse bias may remain.
	- subsampling of nonrespondents.	- increased cost because of extra effort required and nonresponse bias reduced, though not entirely eliminated.

Stage of Survey	Dealing with Missing Data	Implications
	- ignoring nonresponse in the field.	- reduced sampling variance, possible under-estimate of totals unless weight adjusted at processing stage.
		- nonresponse bias may be extensive.
	- imputation nonresponse.	- reduction of nonresponse error but not elimination of it by appropriate imputation procedure.
	- formation of adjustment cells.	- some reduction in sampling variance through ratio estimation or use of independent sources of data for imputation.
	- weight adjustment or explicit substitution for missing data.	- slight increase in processing cost because of possible complex procedure to deal with missing data.
		- some difficulty of analysis of complex survey data beyond that arising from using other than SRS sample, because of missing data and imputation for them.
		- difficulties of warning users of missing data

6 Reporting of Nonresponse

A systematic and continuing record of response/nonresponse would greatly facilitate nonresponse studies. A uniform strategy for various outcomes of personal and telephone surveys is suggested in Table 2.

Table 2 RESPONSE OUTCOME FOR PERSONAL AND TELEPHONE SURVEYS



Based on Table 2, one can construct Accountability Tables whose purpose is to exhibit any reduction from the number of units in the sample to the units for which responses are made. The units are classified into categories for exclusion, for ineligibility, for various types of response/nonresponse etc. For example, for a particular survey an Accountability Table may look as follows:

Accountability Table

Name of Survey	: Income Survey
Survey Population	:
Target Population	:
Type of Data Collection	: Personal Interview
Selected Sample Size	:
Number of Contacted Units	:
Number of Eligible Units	:
Number of Vacant Units	:
Number of "No one at home"	:
Number of Refusals	:
Refusals by Reasons	:
etc	
Number of Temporary Absent	:
Other Type of Nonresponse	:
etc	

Accountability Tables may be classified by stratum, interviewing area, and interviewer in order to facilitate the management of the survey, including making decisions on whether additional support is required for certain areas, interviewers, or reassignment of units to other interviewers.

Furthermore, Accountability Tables may serve two main purposes. First, they include the ingredients from which nonresponse rates can be calculated. Second, they enable the management of the survey to be improved. For example, if Accountability Tables are kept up to date,

then the management of the survey will be able to decide whether and where special efforts are required.

In general, Accountability Tables are preferred so that a better understanding, control, and monitoring of nonresponse and other related items may result.

Recommendations and Research

RECOMMENDATIONS

1. Nonresponse must be considered at all major survey operations, i.e. survey developments, data collection, processing and analysis.

2. Reporting of nonresponse should not only include the total but all other components as well. Also, if possible, a measure of the difficulty of getting responses, such as distributions of the no. of callbacks is desirable.

4. Expenditure related to reporting and recording of nonresponse should be carefully examined.

RESEARCH

1. Research is needed to establish the impact of nonrespondents on the estimates.

2. The effect of questionnaire design on the magnitude of refusals.

3. The effect of various methods of interviewing on such components of total nonresponse as "no one at home" and refusals.

4. What determines different response mechanism for different characteristics and different types of respondents.

5. Applicability of models to studying nonresponse.

6. There are a number of methods of improving estimates that take into consideration nonresponse that should be evaluated. These methods include stratification, hot-decks, weighting procedures, and other methods like imputation.

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